



Systems Reference Library

IBM 1410/7010 Operating System (1410-PR-155)

Utility Programs – 1410-UT-973

This publication provides programmers and systems analysts with a description of the functions performed by the IBM 1410/7010 Operating System Utility Programs and the requirements for their use. These programs permit the user to obtain printed listings of all or part of core storage, magnetic tape storage, and IBM 1301 and 2302 Disk Storage. The programs also provide disk address and format generation, data file generation, and the capability to save and restore data files.

The reader of this publication should be familiar with the concepts and use of the System Monitor. This information is included in the publication *IBM 1410/7010 Operating System; System Monitor*, Form C28-0319.

NOTE: The IBM 1302 Disk Storage Unit is now designated the IBM 2302 Disk Storage Unit; there has been no change in the unit itself, in the applications for which the unit may be used, or in the programming parameters used to specify those applications. The IBM 2302 Disk Storage Unit designation has been used in the text of this publication; programming parameters remain unchanged and refer to 1302.

MAJOR REVISION (August 1965)

This publication is a major revision of *IBM 1410/7010 Operating System; Utility Programs*, Form C28-0353-2, and makes that publication and its associated Technical Newsletter (N27-1214) obsolete. References to the IBM 1302 Disk Storage Unit have been changed to reflect its redesignation as the 2302 Disk Storage Unit; information about data file production has been added. Other minor changes not previously published are indicated by a vertical line at the left of the affected text; figure changes are indicated by a bullet (•) at the left of the figure caption.

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This publication provides programmers and systems analysts with the information needed for using the IBM 1410/7010 Operating System Utility Programs. These utility programs create listings of core storage and tape and disk files, generate formats and addresses for disk storage, perform file save and restore operations, and generate data files.

The utility programs provided are:

- Snapshot
- Storage Print
- Tape Print
- Disk Print
- IBM 1301 Format/Address Generator
- IBM 2302 Format/Address Generator
- File Save
- File Restore
- Data File Generator

NOTE: Three utility programs for IBM 1311 Disk Drives are also available to the Operating System user. These programs are: (1) IBM 1311 Disk Format/Address Generator, (2) IBM 1311 Disk Label Program and (3) the Disk Print program (listed above), which

is used to print the contents of IBM 1311 Disk Storage Drives. Descriptions of 1311 Format/Address Generator and 1311 Disk Label Programs, and a discussion of use of the Disk Print program for IBM 1311 Disk Drives, are contained in the publication *IBM 1410/7010 Operating System; Support of IBM 1311 Disk Storage Drives Under the Operating System*, Form C28-0402.

Prerequisite Publications

The reader of this publication should be familiar with the information contained in the following publications:

IBM 1410/7010 Operating System; Basic Concepts, Form C28-0318.

IBM 1410/7010 Operating System; System Monitor, Form C28-0319.

Minimum Machine Requirements

The minimum machine requirements for using these utility programs are specified in the publication *IBM 1410/7010 Operating System; System Generation*, Form C28-0352.

Control of the Utility Programs

The operation of all utility programs except Snapshot is controlled by special utility control routines, which are brought into core storage by a MON\$\$ EXEQ UTILITIES card (see Figure 1). In addition there is at least one Utility control card for each utility program. Some utility programs require additional cards. The control routines (1) read the Utility control card that follows the Monitor card, (2) bring the appropriate Utility program into core storage, and (3) provide the routine with information from parameters entered on the Utility control card. After each Utility program has been executed, the control routines check for other Utility control cards; thus several Utility programs can be executed by using one MON\$\$ EXEQ UTILITIES control card and several Utility control cards.

Line	Label	Operation								OPERA
3	96	1518	2021	28	30	38	40	48		
0.1	MON\$\$	EXEQ	UTILITIES							
0.2										

Figure 1. Monitor EXEQ Utilities Card

The Utility control cards and the programs to which they refer are as follows:

CARD	PROGRAM
DUMP	Print programs
FORM	Format/Address Generator programs
SAVE	File Save program
RESTO	File Restore program
FILGN	Data File Generator program

A blank in any column from 21 to the end of the control card signifies the end of the control parameters for that card; no columns beyond the blank are scanned.

The IBM 1301 and 2302 Format/Address Generators and Data File Generator program use additional control cards. The IBM 1301 and 2302 Format/Address Generators require HA2 and REC control cards. The Data File Generator program requires file-specification control cards. In addition to the control cards, the Data File Generator program requires input data cards.

The File Save program may require additional control cards: if the disk surface type of save is used and more than one surface is to be saved, one control card is required for each additional saved surface.

Utility Control Card Errors

Two types of errors can occur when the Utility control cards are used: errors in parameter specification, and control card read errors.

Parameter-Specification Errors

The following messages may be issued on the SPR as a result of Utility control-card parameter errors. The entire contents of the card in error are printed. If the card in error is a FORM or SAVE card, the Utility control routines also issue a 10401 console message and set a special end-of-program condition in Resident Monitor.

INVALID FIRST PARAMETER

... (control card in error) ... **UTERR**

There is an error in the first parameter.

INVALID PARAMETER (parameter creating error)

... (control card in error) ... **UTERR**

There is an error in a parameter other than the first.

MISSING PARAMETER

... (control card in error) ... **UTERR**

One (or more) of the required parameters has been omitted.

Read Errors

If the SIU is a card reader and a read error occurs, the reader stops and an IOCS error message appears on the console typewriter. If the SIU is a magnetic tape unit and a read error occurs, the course of action followed by the Utility control routines depends on the type of Utility card-image read, as follows:

1. If the Utility control card with a read error is a FILGN card, control is given to the Data File Generator program, which reads the next card. In this case, because FILGN is the only entry on the card used by the program, the file generation control routine ignores any errors except in FILGN. See item 3 for action taken if a read error occurs in the FILGN entry.

2. If the Utility control card with the read error is a FORM, SAVE, or RESTO card, the following occurs: (a) the Utility control routines print the following message on the SPR:

READ ERROR ON SIU

... (control card in error) ... **UTERR**

and (b) the program issues a 10401 console message and sets a special end-of-program condition in Resident Monitor.

3. If the Utility control card with a read error is a DUMP card, or if the card cannot be identified, the program issues the READ ERROR ON SIU message, as described in item 2. The contents of the control card in error are printed. The control routines then read and analyze a new card.

Print Programs

A printed listing of all or part of core storage or magnetic tape or disk storage may be helpful when testing a program. The utility programs that make these listings available are Snapshot, Storage Print, Tape Print, and Disk Print. If the user's SPR is a magnetic tape file, the listings can be printed on an IBM 1401 System by means of the POW program (see the publication *IBM 1410/7010 Operating System; Operator's Guide*, Form C28-0351).

The Snapshot program provides listings of core storage during the program run; if Snapshot is specified at System Generation, the utility program also provides a core storage listing at Unusual End of Program. The programmer specifies how much of core storage is to be printed and the points in his program at which Snapshot listings should be provided.

The Tape Print and Disk Print programs can be used before or after any program run.

The Storage Print can be used only after entry to Unusual End of Program. If Storage Print is to be executed within the same job as the program to be printed, that program must be run in TEST mode. A production program can be run in TEST mode at any time.

Listings

The output of the print programs is on the SPR, which can be either an IBM 1403 Printer or an IBM 729 or IBM 7330 Magnetic Tape Unit. The POW program can be used to print the tape.

All of the print programs use the same format for their listings: 100 characters per line, in 10 groups of 10 characters, for each line of data. Two print lines are normally used for each line of information. This format permits word marks and other identifying characters to be printed over the appropriate character. The status indicator settings, parity, and index registers are printed when applicable.

Because there is a limit to the number of different characters that can be put on any one print chain, certain valid characters cannot be printed. Substitute characters are provided for these and are identified as such on the listing. The following substitution table applies to all print chains.

A substitute character is identified by an "I" over the character. Word marks for standard characters are designated by a "V" over the position of the character. A substitute character with a word mark is identified

by a "Y" which may be thought of as a combination of the "I" and "V" indications.

UNPRINT- ABLE SYMBOL	BCD CODE	NAME	SUBSTI- TUTE
?	CBA82	Question Mark (plus zero)	+ or &
!	B82	Exclamation Point (minus zero)	-
	CBA8421	Group Mark	
	A8421	Segment Mark	H
m	CA841	Word Separator	W
\	CA842	Backslash	/
b	A	Substitute Blank	blank
[BA841	Left Bracket	L
]	CB841	Right Bracket	R
✓	C8421	Tape Mark	T
<	BA842	Less Than	S
>	842	Greater Than	G
;	CB842	Semicolon	,
:	841	Colon	.
Δ	B8421	Delta	D

Control of Print Programs

All print programs except Snapshot are individual phases of a multiphase program, requiring only one control card (DUMP) in addition to the MON\$\$ EXEQ UTILITIES card. The Snapshot program is under control of a Linkage Loader SNAP control card, System Generation card, or Autocoder calling sequence rather than a Monitor control card.

All of the utility print programs except Snapshot require that the control routines be brought into core storage by the MON\$\$ EXEQ UTILITIES card (see "Control of the Utility Programs").

The operator can interrupt any of the Utility print programs, except Snapshot, and return to the control routine by the following procedure:

1. Press Inquiry Request key
2. Enter \$3x (x can be any character except a blank)
3. Press Inquiry Release key

The generation of the listing stops, and the message **CONSOLE INTERRUPT, PROGRAM TERMINATED** is printed. The control routine then reads and examines the next card in the SIU.

Snapshot

Snapshot can be used to print all or parts of core storage during the program run. Snapshot is a relocatable subroutine used primarily for testing programs. All of core storage may be "snapped," if desired.

Snapshot also prints the location of the next instruction to be executed (identified by the prefix "IR") and four of the status indicators (high, low, equal and zero balance).

The programmer can use one of two methods to obtain a Snapshot: a SNAP card or an Autocoder calling sequence. A MON\$ EXEQ UTILITIES control card is *not* used.

Snapshot can be incorporated as part of Resident Monitor (see *System Monitor* publication).

Index registers 1-4 and 13, which are used by the Snapshot program, are saved and restored. The same is true for settings of the compare indicators, overflow indicators, and zero balance indicator.

SNAP Card

SNAP cards direct the Linkage Loader to create patches in the user's program. Each card defines one or two areas to be printed at a given point in the user's program. If more than two areas are desired, additional SNAP cards can be used. For details of the SNAP card, see the *System Monitor* publication.

Autocoder Calling Sequence

The Autocoder calling sequence provides the same calling sequence as the SNAP card. If used, it must be coded into the source programs by the programmer.

Like the SNAP card, each Autocoder calling sequence can designate one or two areas to be printed. If more than two areas are desired, the end of the execution of Snapshot may lead to another calling sequence instead of returning to the dependent program. The calling sequence that must be used to execute Snapshot is indicated in Figure 2 (except for the operand "SNAPSHOT" in line 1, the operands and comments used are examples).

Operation	Operand	Comments
DCWS	SNAPSHOT	Branch to Snapshot
DCW	@N000000000000@	May be used to insert instruction(s)
B	EXIT1	Branch to program or another Snap
DCW	@30497@	First start address
DCW	@31984@	First stop address
DCW	+START	Second start address
DCW	+EXIT3	Second stop address
DCW	@PROG8@	Identification

Figure 2. Snapshot Calling Sequence Example

The first line appears as shown in the example in Figure 2 unless Snapshot has been included in Resident Monitor. (If Snapshot is in Resident Monitor, the first line of the sequence should be B /SNP/ rather than DCWS SNAPSHOT.) The second line of the sequence may be used by the programmer for the instruction or instructions displaced by the patch that branches to the Snapshot program. For example, the user might follow the DCWS SNAPSHOT with:

```
DCW      @ N00000 @
BU       NSINS
```

The instructions (or NOP) that are inserted between the first and third lines of the calling sequence must occupy exactly 13 positions of core storage. In the above example, six characters are generated by the DCW and seven characters by the Branch Unequal coding — a total of 13.

Contrary to the usual calling sequence, when the Snapshot is completed, it branches to the position following instruction:

```
DCWS      SNAPSHOT
```

The B EXIT instruction can branch to another Snapshot sequence or to the user's source program. The start and stop address may be either actual addresses or address constants. In the example, the printed listing will include the contents of the area from 30497 to 31984 and the area defined by +START and +EXIT3. If only one area is to be printed, the second start and stop addresses must contain blanks.

The last DCW, which must be five characters, is the programmer's identification of the point in the program at which the Snapshot occurs. It will be printed just as it appears in the calling sequence.

Snapshot Listing

Figure 3 is an example of a Snapshot listing.

The first line of each Snap listing requested contains the Snapshot identity specified in the Autocoder sequence or the SNAP card, the location of the next instruction to be executed (IR), the status indicator settings, the date, and the requested start and stop addresses for the Snapshot. If the programmer has specified the start address higher than the stop, the Snapshot program will exchange the two addresses before preparing the printout. Asterisks identify the indicators that are on.

The next line (line 00000) shows the contents of the first hundred positions of core storage; the user can refer to this line for the contents of the index registers. The contents of the specified areas of core storage follow. The program prints the storage areas from the first hundreds position at or before the specified start address (absolute) to the next 99's position at or above the stop address. Print lines from completely blank storage areas are omitted from the listing.

Storage Print Program

The Storage Print program prints the contents of specified areas of core storage, the contents of the Instruction Address Register, the settings of four of

[illegible]

Figure 3. Example of Snapshot Listing

the status indicators (high, low, equal, and zero balance), and the contents of the index registers. This print program can be used only on those systems that have a Core Image file option specified.

The Storage Print listing is obtained from the Core Image file. Records are written on this file only when a program reaches /UEP/. The program to be printed must be run in TEST mode if a Storage Print is to be executed within the job.

Three records are written on the Core Image file each time entry is made to /UEP/:

1. All of core storage
2. The dependent-program area of core storage
3. An area beginning at a point (defined by the contents of /OGR/) within the dependent area and extending to the end of core storage

These three records are referred to collectively as one storage write. The last record should be at least the size of the Storage Print program, which is approximately 8,000 characters, including the Utility control routine. See "Extended iocs Macro-Instructions, IOCTL CHKPT" in the publication *IBM 1410/7010 Operating System; Basic Input/Output Control System*, Form C28-0322, for details of /OGR/.

Storage Print Control Card

Each Storage Print (DUMP) control card specifies one area to be printed. If the Core Image file currently in use is the one to be listed, the control card has the format shown in Figure 4.

[illegible]

Figure 4. Control Card Format, Storage Print from Current Core Image File

Line	Label	Operation	OPER
5	36	15 16 20 21 25 30 36 40 45	
0 1		DUMP CORE, MWO, ALL, U	
0 2		DUMP CORE, MWO, name, start, stop, U	
0 3			

Figure 5. Control Card Format, Storage Print from Previous Core Image File

ALL Print all storage writes residing on the Core Image file. No start or stop addresses are accepted.

LAST Print an area of the last storage write recorded on the Core Image file. The area is specified by the start and stop addresses.

name Print the defined areas of all storage writes of the program identified by this “name.” “name” is the dependent program as defined on the EXEQ card for that program. All programs called “name” on the Core Image file are printed.

The start and stop parameters are the limits of the area to be printed. They can be any of the following:

1. Absolute addresses calculated from the listings produced by a compiler and the Linkage Loader.
2. The beginning of the dependent program area (specified by /ORG/), the end of the last batch program (specified by /SIZ/), and the end of core storage minus 2 (specified by /AMS/).
3. Any number of positions in either direction from these reference points. The parameter is specified by nine characters, i.e., the reference point, a sign, and a five-digit number, such as ORG+00078. If start or stop is omitted all of core storage is printed.

If the Core Image file was prepared previously, or on another system, it must be mounted on a tape unit that is assigned to `MW0`. In this case the `DUMP` control card has one of the formats shown in Figure 5.

CORE	Specifies the Storage Print program.
MDM	The current Core Image file is to be printed.
XXXXX	The parameter shown as xxxxx in Figure 4 is one of three possible entries:

Parameters in the control card for the case of a previously recorded Core Image file are the same as for the current Core image file control card, with three exceptions:

1. The tape is specified as MW0.
2. The "LAST" option is not available.
3. There is an additional optional parameter, U, that causes the MW0 to unload when the storage print is complete.

The MW0 is always rewound after the storage print is processed.

NOTE: In all Storage Print control cards, omitted parameters do not have to be indicated by commas.

Storage Print Listing

The format of the Storage Print listing (see Figure 6) is similar to that of Snapshot. On the first line are printed the program name and number of the phase (if the dependent program is a multiphase program), the contents of the Instruction Address Register, settings of status indicators, the date of the run as it appears in /DAT/, the date of the storage listing, and the start and stop addresses. On the second line are printed pertinent system symbols and their absolute address equivalents. The symbols are the following: /MID/, /PHN/, /AMS/, /TPB/, /ORG/, /DAT/, /CPT/, /SIZ/, /OCR/. The contents of the first 100 storage positions (including the index registers) are printed on

the third line. The following lines display the contents of the specified area of core storage.

The program prints the storage areas from the hundreds position at, or immediately before, the specified start address (absolute) to the next 99's position at, or above, the stop address.

If the start and stop addresses are specified incorrectly, reversed, or omitted, all of core storage is printed.

When the control card is punched as the example in Figure 7, positions 01700 to 78999 on an 80,000-character system will be printed. (The first and last lines are always printed in their entirety.) The last storage write on the Core Image file is the one printed.

It might not be possible to print a complete storage write. This may occur when the storage write is printed by a system smaller than the one on which it was made, or when it is printed on a system with a dependent area shorter than about 16,000 positions. If it is not possible to print all of the requested area, the partial lines of the area are filled with asterisks, and the message THIS PORTION NOT AVAILABLE appears between the lines. Figure 8 is an example of such a printout.

CORE	DUMP	UTPRINT	001	IR	30138	ZE *	HI *	EQ	LO	OATE	6426B	64266	START	00000	STOP	02300
SYSTEM	SYM8DLS	24634MID17561PHN17601PNM17571AMS17581TPB17586ORG17566DAT14628CPT17591SIZ17586ORG														
00000	J17923	F000056RX0	0025+18460							2565825688					2761830183	0000A24027
00100	ZG084278J0	0121VM0012	7+00121614	4788J00148						UJ00155SG1	4477850229	908427Y035	124Y031423		Y027722J02	3251Y02251
00200	1V00300Y07	061X													2596024027	260301547F
00300	Y03942QY00	314UT05863	154101V020	1360009988						00++260124	4A601550AC	00++300095	G03727A+00	008900517/	+00+J40009	
00400	9WC+800940	00+/6QW005	1200+J6+C9	91Y9991Z5J	01299T0991	2100++7TWO	082000+K10	C991Y91468	5J00501/-9	9122J00512						
00500	A00501991	Y9827532G0	0089AW0091	100+K12D00	+7005503M	#F000++0MW	00650000+-7	2X005982X0	4203+00235	3154532VA0						
00600	0+J6102566	14663JM+F4	14413WX006	33+M=F9144	13WX02572+	+0074+100+-	7410068921	04097+0032	31000002VA	00+J610328						
00700	314663JM=F	414413W100	724+M=F914	413W103289	+300768230	4150+D0286	1000002VA0	0+J6102913	14663JM+F4	14413W3008						
00800	03+M=F9144	13W302919+	W0086200+K	110991Z199	118T0991X9	00861/W000	000991Y300	+77A00874	991Y3C991Y	3J00512/S9						
00900	91Y3J00470	000+-7009	243M(F0991	11WJ00559	W0102600+J	6+C991Y699	1Z5J01299T	0991Y900++	9TDDA991Y9	991Y6W0101						
01000	800+K18A14	830991Y6NJ	09921 W010	6100+K1150	010100099D	00++000++7	3000++0147	943T147941	5437660117	686011928G						
01100	012148+00+	+414798N80	1137147961	J01276UW01	160147981A	0114914798	+147981480	3500000147	9880124700	000 M*F014						
01200	794W014803	00000L+005	1700089R04	256+D00315	000002VD00	+601294LM	*F001288WJ	01204 S011	1814796JR	HAMEL000+0						
01300	0372701325	10000+00+-	0000000022	7300+/5200	579500+K30	+005170008	9101727037	04J8154166	00099AT052	5299114460						
01400	00998+00++	100094000+	J501437TM*	FX00000RG1	44948+00+-	108641+00+	+26015508D	DD0NNNNJ0	14921R0138	62+00++1A0						
01500	149814662J	02218 W016	3000+-72W0	158500+-7-	+00+-00000	0V03625037	041D015500	372710DD0V	01726+00+-	015453V036						
01600	2503704100	1595037271	DDDDV01726	+0168700+-	74+00+-000	000V036250	3704100164	00372710DD	0V01726+00	+000000V0						
01700	3625037041	0016970372	7100D0B144	76603733AJ	03804 V022	9901437K80	2299014313	W018210143	1180182101	4312+01436						
01800	00099D00+A	600++63D0D	0001832014	313D014370	2206XV0218	5V02820024	93K8028200	24873D0188	6024873002	49302738XV						
01900	02717V0356	003414K803	560034083D	0192803408	3003414033	17XW03296V	0319003044	K803190030	383D019820	30383D0304						
02000	402947XV02	926Y013735	+086360009	4J02325V+0	0+-008636J	02063VJ020	76 808636G	08604AS00+	-0000+J502	206XV02185						
02100	000+J00211	6PNFIN-R02	1122102113	02115R0439	74D0021300	+0XV00187	00+-118165	1100+-72Y1	5564XA0218	514662NM*2						
02200	023135W+00	0940864100	0+J9022793	J023251R02	2511R02197	2+08641000	94A0018714	662R04269*	R022874W01	74600+K52W						
02300	0382900+K4	2DW07836J0	3579 J0284	62Y027722Y	02346F,146	63T0586315	4531V02565	G000998800	+2600595A	G01595AY00						
END DF CORE	DUMP.															
MON\$*	END															

Figure 6. Example of Storage Print Listing

Line	Label	Operation	OPERAND													
3	5	15	16	20	21	25	30	35	40	45	50	55	60	65	70	
0.1				DUMP CORE,MDM, LAST, 0.1703, AMS-0.1000												
0.2																

Figure 7. Example of Storage Print Control Card

51100	Y	V	Y	V	V	V	V	V	V	V	V	V	V	V	V
	1-00100J07	173	C99IZ1	J06178VA06	164991Z1J0	6190VJ0632	2	80632209	881R0006/0	06207/Y135	10EG062218	D235740009			
51200	VV	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	5#DG06221A	G06836A600	09900089J0	9120	C0591	309881W065	42001004W0	6755001008	C011960988	1,06467J06	761	NSJ091			
51300	VV	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	98 0A00100	B600089000	99J09120	W	16239006/3	1Y09146XJ0	6418	*****	*****	*****	*****	*****			
	THIS PORTION NOT AVAILABLE														
90000	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	15973 Y091	46X8051540	06/68J0919	8	CJ07173	NJ06819 ,0	6467000ES3	06497AW000	0000992309	918TJ09021	20101	B06			
90100	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	41809914CJ	06498 V161	63006A3SY0	9146XW0658	7006/6#J09	198 85991Y	9W06605006	/675991Y30	06616006/5	#5006T3600					
90200	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	6+000094J0	6819V00010	0006K30006	6166006-00	0094J06684	VJ06641 J1	5973 Y0914	6X,0878080	7173006/64	#08780V067					

Figure 8. Example of Partial Printout

Entry to /UEP/ can be made in three ways: (1) by error branch or coded branch to UEP, (2) by the Console Inquiry message \$10, (3) or by computer reset and start (RST). Because of the varied entry to /UEP/, the contents of the registers and indicators, as printed, are not always valid. The contents of the index registers, the high, low, equal, and zero balance indicators (H, L, E, and Z), and the contents of the Instruction Address Register (IAR) are printed. Figure 9 shows which registers or indicators contain valid information under each of the three above conditions.

	IAR	H, L, E & Z	X1-X12	X13	X14-X15
UEP	YES	No	Yes	Yes	Yes
\$10	YES	Yes	Yes	Yes	No
RST	YES*	Yes	Yes	Yes	Yes

* This will always be 00008

Figure 9. Valid Indicators and Registers

Storage Print Messages

The following messages may appear in the listing on the SPR:

RCD 1 MAY HAVE ERR IN AREA 0 — ORG.

RCD 2 MAY HAVE ERR IN AREA ORG — OGR.

RCD 3 MAY HAVE ERR IN AREA OGR — AMS.

The above messages occur if a data check is detected in reading the indicated record.

PROGRAM REQUESTED NOT ON TAPE.

The name of the program to be printed was not found on the specific tape.

LAST TAPE RECORD NOT A CORE DUMP.

No storage print entry is present on the portion of the Core Image file specified on the control card.

THIS PORTION NOT AVAILABLE.

This message appears if the area available in core storage is not large enough to read in all of the specified dump (see "Storage Listing").

WORK AREA TOO SMALL TO OBTAIN STORAGE PRINT.

There is not enough room in the dependent program area to contain both the Storage Print program and the smallest tape record that can be used by it. The size of that record is equal to the largest value in the table of system symbol values to be printed in the second line of the storage listing, with the exception of /MID/ and /TPB/.

UNIT NAMED NOT MDM OR MW0.

This message is self-explanatory.

CONSOLE INTERRUPT, PROGRAM TERMINATED.

The processing of the print program has been interrupted by a \$3x message from the console.

END OF CORE DUMP.

The Storage Print processing has been completed.

Tape Print Program

The Tape Print program prints the contents of any reel of tape as specified on the control card. If more than one tape physical unit is assigned to the specified symbolic unit, the tape reel printed is the one on the last physical unit used for that symbolic unit. Output is placed on the physical unit assigned to the SPR.

The Tape Print program, including the Utility control routine, requires approximately 7,000 positions of core storage. If a tape record to be printed is larger than available core storage, as much as possible of the specified tape record(s) will be printed. The Asterisk-Insert switch must always be ON.

The tape can be read in Move mode or in Load mode. Printing can start at one of the following points:

1. Load point
2. A specified number of tape records or files from load point
3. The current tape record
4. A specified number of tape records in either direction from the current record
5. A specified number of file records forward from the current record

A tape-mark record is any record whose first character is a tape mark. For the Tape Print program all tape-mark records are counted and treated as tape records, whichever direction the tape is moved.

Printing will stop at one of the following points:

1. End of the last specified record or file
2. Standard end-of-reel trailer (1EOR)
3. Special trailer (1EOTBTAPEDUMP)

Tape Print Control Card

The format of the Tape Print (DUMP) control card is shown in Figure 10.

The first operand must be TAPE; the other operands can appear in any order.

The operands have the following meanings:

TAPE	This entry specifies the Tape Print program.
Mxy	This entry specifies the symbolic unit from which data will be printed. (x must be R, T, or W; y is the specific unit.)
mode	(Optional) LOAD or MOVE. If this entry is omitted, Load mode is assumed.
TLR	(Optional) This entry causes immediate writing of the special trailer label 1EOTBTAPEDUMP on the tape. The tape is then rewound. The program next moves the tape forward as specified in the $\pm pxxxxx$ parameter and prints the tape records following. The print processing stops when the special trailer label is encountered or the specified number of tape records or files are printed. If this option is specified and the user's program rewinds an output tape, the Tape Print program will write the trailer at the beginning of the tape and the tape will not be printed.
RWD	(Optional) This entry causes rewinding of the tape, establishing load point at the starting position of the next operand.
$\pm pxxxxx$	(Optional) This entry specifies the distance and direction the tape is to be moved before process-

ing the printing. The first two characters can be +T, +R, or -R. -T cannot be used. The sign indicates the direction, and the letter indicates whether tape-mark records (T) or data records (R) are to be counted. The value of xxxxx can be zero. If this entry is omitted, the parameter +R00000 is assumed, leaving the tape in the same position.

yyyyyy

(Optional) The first character must be T or R. yyyyyy specifies the number of tape-mark records (T) or data records (R) that will be counted in processing the printing. The value of yyyyyy can be zero. R00000 (no printing) used in conjunction with $\pm pxxxxx$ is useful for positioning a tape. Omission of this operand has the effect of T99999. To space forward from the current record 25 files plus 1500 records, two cards can be used. The first would specify the last two operands as +T00025, R00000, and the second, +R01500, R00004. Four records would be printed.

A Tape Print specified as in Figure 11 prints the contents of the tape on unit MR1 specified on the control card in Load mode. A special trailer record is first written on the tape and the tape is rewound (note that the RWD entry is omitted). Then the tape is moved forward 24 records. Thirty-seven records are printed unless a standard or special trailer label or trailer record is encountered.

NOTE: Omitted Tape Print parameters do not have to be represented by commas.

Tape Print Listing

The tape listing (see Figure 12) is similar to that of the other print programs.

The first line of the tape print reproduces the control card information. It is followed by a line with the column heading Record/Chars a statement of tape parity, and the tape-mark count. This line, with the current tape-mark count appears at the top of each page of the listing.

The first line of each record printed contains the record number, followed by the number of characters in the record. The rest of the line contains the data in the first 100 positions of the specified tape record.

Line	Label	Operation	OPERAND											
3	56	1516	2021	25	30	35	40	45	50	55	60	65	70	
0.1			DUMP	TAPE	Mxy	mode	TLR	RWD	± pxxxxx	9.44444				
0.2														

Figure 10. Format of the Tape Print Control Card

Line	Label	Operation	OPERAND										
3	56	1516	2021	25	30	35	40	45	50	55	60	65	70
0.1			DUMP	TAPE	MR1	LOAD	TLR	+R00024	R00037				
0.2													

Figure 11. Example of Tape Print Control Card

TAPE PRINT MW3 IN LOAD MOODE																	RWD	#R00002 R00001																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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Each of the following lines is numbered to show the number of the first character on that line.

The operator has entered a \$3x message from the console.

The following messages may appear in the listing on the SPR:

The tape print has been completed.

This message is given when a tape listing for a symbolic unit that is not a tape unit, such as a 1301 disk unit, has been specified.

SYMBOLIC TAPE UNIT NOT AVAILABLE

A tape print of a symbolic unit that is not assigned or is not a work, reserve, or Tele-processing unit has been specified.

TAPE MARK ppppp qqqqq RECORDS SINCE THE LAST MARK
The listing has now reached tape mark ppppp.
There were qqqqq records after the last tape mark.

The parity of the tape records changes at this point.

There is at least one parity error in the next tape record. The record is printed and the location of each error in the record is indicated by an asterisk.

The next record printed is a noise record. It is less than 13 characters long and has a parity error.

Disk Print Control Card

The Disk Print (DUMP) control card specifies one area of disk storage to be printed. The listings can start at the beginning of a symbolic unit or a specified number of tracks from that point.

Figure 13 shows the format of the Disk Print (DUMP) control card. The type of disk unit (e.g., 1301) must be the first operand; the other operands can appear in any order.

The entries have the following meanings:

- disk This entry specifies the type of disk unit, for example, 1301.
- Mxy The Mxy entry specifies the symbolic unit containing the records to be printed (x must be either R, T, or W; y is the specific unit).
- mode (Optional) The mode entry is either LOAD or MOVE. If the entry is omitted, Load mode is assumed.
- +sssss This operand specifies the number of tracks or records to be spaced from the beginning of the symbolic unit before the print is begun. The sign must always be plus. Omission of this operand has the effect of +00000.
- ppppp The ppppp entry specifies the number of tracks to be printed. Omission of this operand has the effect of 99999.
- Gzz (Optional; required for Form C files) The G in this operand indicates that the file is a Form C file (sequential-geometric); zz must be two numeric characters, specifying the number of records on each track. The Read Single Record instruction is used by the utility program.

A card punched as in Figure 14 requests a print of the 466th through 490th tracks of symbolic unit MR2. The tracks, recorded in Move mode, are read with the Read Single Record instruction. Each track contains two records.

NOTE 1: Omitted disk parameters do not have to be represented by commas.

NOTE 2: A disk dump control card which does not specify the Gzz parameter will cause a full track to be dumped. The Gzz parameter can be used for Form C records and for Form G records, if the Form G record format conforms to the Form C record format. When using the Gzz parameter, less than a full track can be

read. However, the dumps will always begin with the first record on the track. When using the Gzz parameter the ppppp specifies the number of records to be printed rather than the number of tracks.

Disk Listing

The disk listing (see Figure 15) is similar to that of the other Utility print programs.

The first line of the listing reproduces the information on the control card. The second line consists of the column heading Track/Chars, a statement of the mode (Move or Load), the page number, and the date as contained in /DAT/. This line is repeated, with the correct mode and new page number, at the top of each page of the listing. The third line contains the track number, the number of characters in the record, and the address used to read the track.

The listing of the contents of the records is in the same format as the other printed listings. Blanks are counted as characters, and the cumulative character count is indicated in the margin.

Disk Print Messages

The following messages may appear in the listing on the SPR (messages containing 1302 refer to the 2302 Disk Storage Unit):

NEXT TRACK HAS PARITY ERROR

There is at least one parity error in the next disk track. The contents of the track are processed and the location of each error in the record is indicated by an asterisk.

CHANGE MODE

The mode of the disk records changes at this point.

SYMBOLIC UNIT NOT 1301

The programmer has specified a 1301 Disk Print for a symbolic unit that is not a 1301 unit.

SYMBOLIC UNIT NOT 1302

The programmer has specified a 2302 Disk Print for a symbolic unit that is not a 2302 unit.

Line	Label	Operation	OPERAND														
3	5	6	15	16	20	21	25	30	35	40	45	50	55	60	65	70	
0.1			DUMP	d	i	s	k	,	M	x	y	,	m	o	d	e	,
0.2				+	s	s	s	s	s	,	p	p	p	p	p	,	G

Figure 13. Format of the Disk Print Control Card

Line	Label	Operation	OPERAND														
3	5	6	15	16	20	21	25	30	35	40	45	50	55	60	65	70	
0.1			DUMP	1	3	0	1	,	M	R	2	,	M	O	V	E	,
0.2				+	0	0	4	6	5	,	0	0	0	2	5	,	G

Figure 14. Example of the Disk Print Control Card

1301 PRINT MR0 IN LOAD MODE +00009 00001									
TRACK/CHARS LOAD MODE									
DATE 64262 PAGE 1									
1 2171 00240900 00									
1	2409001336	6901151633	8358W33931	17603*V338	37336682D3	366633668T	0355863544	0103171133	7994V33270
101	44A3558635	5482355483	5548Y25745	X 3544	035440NJ33	270 J31711	J30878 535	58633668J0	0000 NJ338
201	33724 J336	03 J30925	03390500--	0SJ30878 J	33924 J306	04 END OF	1301 PRIN	T+G339498Y	10106X3162
301	34125BV341	20317141+3	170900034D	35117999R9	7+34136000	44+0000+00	0+00D60003	9AG00044BC	0003400039
401	1410003950	0044000390	3558599299	7C00039356	04J34120SA	3414300044	SJ34071 J0	0000 3560I	3862A4163A
501	716CJ34193	035595317	16C.34942D	0002934951	P.34834348	46.3485834	870.348823	4894.34906	34918.3493
601	43PD0000/93	4855PD0005	934867PD00	0T934879PD	000U934891	PD000V9349	03PD0000W93	4915PD000X	434927PD00
701	31989 6346	618+346670	0034.34833	D000-0000-	0+G00034BC	0003434672	J34444SD34	673001L531	000-1J3438
801	680D349523	4951M+3560	200039J336	03 +346670	0034D346G3	348337T346	G3000-0260	0034BC0003	434672J346
901	00-1383458	8001L5 D34	689001L53J	34508 D355	88001L53J3	4508 53558	600039J346	32VJ34485	0355853483
1001	834*J00000	3495A3483	BVL5+R,DW/	H .GT+-YLS	*R,DW/H .G	T+-G347858	/386177777	777777777	777777777
1101	3861870384	1735618D77	NJ34787 J0	0000-D3561	838621D777	38621/J347	80 000002	34820+000X	0000440000
1201	X900+00760	0044BV0005	834820/J99	9Y8 34953	W34953 13	495300001+	2	0000/1348	204A000W30
1301	000W8J999Y	8VJ000/1 0	013300001	* 0001 +	2	34954+00	0X000044D0	00X900+007	G000448V00
1401	999Y8 3508	7 W35087	1350870000	142	0000/13	49544A000W	3000S15000	S3000W8J99	9Y8VJ000/1
1501	1 * 0001 *	13508800	084 1	0	CHANGE M0	DE* NEXT T	RACK HAS P	ARITY ERRO	R*KTRACK A
1601	FOUND#2	3	5172+000X0	00044D000X	900+007G00	044BV00058	35172/J999	Y8 35305 W	35305 135
1701		D000/13517	24A000W300	0515000530	00W8J999Y8	VJ000/1 00	13300001 *	0001 * 1	3530600303
1801									
1901									
2001	TE								
2101									
END OF 1301 PRINT									

Figure 15. Disk Print Listing

SYMBOLIC 1301 UNIT NOT AVAILABLE

A 1301 disk print of a symbolic unit that is not assigned, or is not a work, reserve, or Tele-processing unit, has been specified.

SYMBOLIC 1302 UNIT NOT AVAILABLE

A 2302 disk print of a symbolic unit that is not assigned, or is not a work, reserve, or Tele-processing unit, has been specified.

CONSOLE INTERRUPT. PROGRAM TERMINATED

The operator has entered a \$3x message from the console.

TRACK ADDRESS XX--XX NOT FOUND

The track address encountered by the program does not correspond to the address given on the DUMP card. The program will read the next record on the file.

END OF 1301 PRINT

The 1301 print has been completed.

END OF 1302 PRINT

The 2302 print has been completed.

IBM 1301 and 2302 Disk Format/Address Generators

The IBM 1301 and 2302 Disk Format/Address Generator programs provide the Operating System with format and address generation for IBM 1301 and 2302 Disk Storage, respectively. Both functions (i.e., formatting and address generation) may be performed in the same run or separately, as desired.

Like other utility programs (except Snapshot), the 1301 and 2302 Disk Format/Address Generator programs are individual phases of the multiphase Utility Programs package. In addition to the MON\$S EXEQ UTILITIES card, the programs require a FORM card, and two or more other control cards following the FORM card. Both programs can be used to generate either standard or nonstandard record addresses.

Standard Record Addresses

For generation of standard record addresses, the user need provide only control card information. Each record address generated can consist of six or more characters. The first four characters constitute the track address, and the remainder, the RA2 portion of the record address. The program increments the first two characters of the RA2 field by one to give consecutive addresses. Control card formats for providing record address information are described under "Control Cards."

Optional Nonstandard Record Addresses

The Disk Format Address Generator programs can also be used to write nonstandard record addresses consisting of six or more characters, as specified by the user. In this case the user provides his own routine to generate the addresses. The routine must be compiled and put in the library in place of IBADDRESSR before the utilities program is executed. The user must ensure the validity of each address he generates.

The record address can be six or more characters and can consist of any characters except commas. The user can, in his routine, increment the addresses in any way he chooses.

The user's routine must observe the following restrictions:

1. The title of the routine must be IBADDRESSR
2. Two linkage symbols must be defined:

RAXF/	DEFIN	labela
RAFF/	DEFIN	labelb

Labela is the symbolic address of the first instruction to be executed in the user's routine. That instruction must be:

```
labela          SBR          exit +5
```

where exit is the label of the last instruction executed by the routine. Labelb is the symbolic address of the low-order position of an area containing the generated record address. This area must be the same size as the record address to be generated. The user's routine must put a word mark in the high-order position of the generated record address. Each time a record address is required the 1301 or 2302 Format/Address Generator program clears this area and branches to the user's routine. The user's routine generates the address and branches back to the Format/Address Generator program, which writes the address on 1301 or 2302 Disk Storage.

Index register 5 is available to the user for his routine.

NOTE: For nonstandard record addresses, the NSTD parameter must be entered on the FORM card (see "Control Cards"). If the user specifies NSTD on the FORM card, but fails to include his IBADDRESSR routine, the 1301 or 2302 Format/Address Generator program writes sequentially-numbered record addresses equal in length to the length specified in the REC card. For example, if the user specifies RA000000 on the REC card, but fails to include the IBADDRESSR routine, the program writes 000001, 000002, 000003, etc., as record addresses.

Control Cards

Each Format/Address Generator program requires three or more Utility control cards in the following order: FORM, HA2, and REC. On all control cards, omitted parameters need not be represented by commas. Leading zeros may be omitted.

FORM Card

This card specifies information such as the type of unit, the symbolic unit, the mode, and the type of format operation. In addition, the user may include other parameters described below. The first operand must be 1301 or 1302 (referring to the 2302 Disk Storage Unit); other operands may appear in any order. One FORM card is necessary for each job. Figure 16 shows the format of this card.

The entries that may appear in the FORM card are as follows:

Line	Label	Operation	OPERAND																							
3	5	15	16	20	21	25	30	35	40	45	50	55	60	65	70											
0.1		FORM	1	30	w	M	x	y	mode	FMT	z	A	WDC	+	n	n	n	n	m	m	m	m	N	S	T	D
0.2																										

Figure 16. Format of the FORM Card for the 1301 and 1302 Disk Format Address Generator Programs

- 130w This entry indicates the type of disk unit used and must occupy the first field. "w" can be either 1 or 2.
- Mxy The Mxy entry designates the symbolic unit to be operated upon. It can be any file assigned to 1301 or 1302 Disk Storage. The file must be a work, Tele-processing or reserve file (i.e., x must be W, T, or R).
- mode (Optional) The mode entry is either LOAD or MOVE. If this parameter is omitted, Load mode is assumed.
- FMT (Optional) This parameter indicates that format tracks are to be written. Either this parameter or the zA parameter must appear on the card.
- zA (Optional) This parameter indicates that track addresses are to be written. "z" can be R or H, RA specifies full track with addresses, HA specifies full track with home address. Either this parameter or the FMT parameter must appear on the card.
- WDC (Optional) This parameter indicates that a Write Disk Check is to be performed after each Write Disk operation. If omitted, no Write Disk Checks are performed.
- +nnnn (Optional) The variable portion of this entry (nnnn) must be numerical and less than five digits long. It indicates the number of tracks in file Mxy to be passed before formatting and/or record addressing is started. If this entry is omitted, zero is assumed.
- mmmm (Optional) This entry must be numerical and less than five digits long. It indicates the number of tracks to be formatted or addressed. If this entry is omitted, the whole file is assumed to be specified. Zero is an invalid entry.
- NSTD (Optional) This parameter indicates that a user's routine will be incorporated to generate non-standard record addresses.

HA2 Card

This card specifies the HA2. If the HA operation is to be performed, this is the home address that is written. If the RA operation is to be performed, the first two characters in this address are verified; however, the entire address must be punched. The card is punched in Autocoder format; however, the operand field can extend through column 80. One HA2 card is used for each job. Figure 17 shows the format of the HA2 card.

- hh... This is the HA2. The length can range from a minimum of 2 characters to a maximum of 60 characters.

Line	Label	Operation	OPERAND										
3	5	15	20	25	30	35	40	45	50	55	60	65	70
0.1		HA2	hh										
0.2													

Figure 17. Format of HA2 Card

NOTE: The IBM 7631 File Control Unit handles only an 8-character disk control word, which contains an HA2 of two characters (the first two characters of the above HA2). The remaining characters of the HA2 are disregarded.

REC Card

This card describes the format and record addresses to be generated. Any number of REC cards can be used.

For standard record address generation, each group of two (minimum) or three (maximum) parameters defines a record. The first two parameters are required; the third is optional. The maximum group consists of: (1) the RA2 portion of the record address, (2) the number of records in the series and the record length, (3) and the padding character (optional). Each REC card can contain as many groups as will fit on the card, however, each group on the card must be complete. Figure 18 illustrates the format of the REC card for standard record addresses.

For nonstandard record address generation, a record address length parameter must be included in each group. This parameter indicates the length of the entire record address. The RA000000 parameter is used instead of RA2rr.

Figure 19 shows the format of the REC card for non-standard record addresses.

The entries for the REC card are as follows:

- RA2rr... (Required if standard addresses are generated) This field must be at least five digits long. The first three are RA2. The rr... (a minimum of two characters) indicates the RA2 portion of the address and may use any characters except the comma.
- nnXgggg This parameter specifies the number of records and the length of each. The number is specified by the nn portion. The entry must be numerical. (The program will accept the specification of three digits; however utilization of a file with this many records per track is uncommon.) The gggg portion specifies the length of each record. It must be numerical and less than five characters long. The two portions must always be separated by an X.
- p (Optional) This parameter specifies the character to be used for padding. It can be any character except a blank or a comma. If blank padding is to be used, the parameter and its comma must be omitted.
- RA000000... This parameter is used only if nonstandard addresses are generated. It indicates the

Line	Label	Operation	OPERAND													
3	5	6	15	16	20	21	25	30	35	40	45	50	55	60	65	70
0.1			REC				RA2rr,nnXgggg,p,RA2rr,nnXgggg,p,etc									
0.2																

Figure 18. Format of the REC Control Card for Standard Record Addresses

Line	Label	Operation	OPERAND									
3	5	6	15	16	20	21	25	30	35	40	45	
0.1			REC				RA0,000,00,nnXg,ggg,p,					
0.2												

Figure 19. Format of the REC Card for Nonstandard Record Addresses

length of the entire record address. RA identifies the field. The number of zeros indicates the number of characters in the address. There must be at least six zeros to satisfy minimum address requirements.

Figure 20 is an example of a REC control card.

This control card defines 14 records for the file; one record of 500 characters, then 10 of 100 characters each, then 3 of 80 each. The records and their addresses appear in the following order:

ttttABLCI	tttt56Q33
tttt50Q33	tttt57Q33
tttt51Q33	tttt58Q33
tttt52Q33	tttt59Q33
tttt53Q33	tttt3J454
tttt54Q33	tttt30454
tttt55Q33	tttt2R454

The tttt is the address of the track on which these records appear; this will, of course, vary for each track in the file. The program adds 1 to the sixth digit of the record address to create the next succeeding record address when more than one record is defined by nnXgggg. The last three records show how the next address is obtained when a minus sign appears in the address; 3J (−31) becomes −30 (the zero is a

minus zero) and then 2R (−29). Any carry to the left of these two positions is lost.

Because more than one REC card may be used, a valid termination of a series of REC cards in one of the following:

1. A MON\$\$ card
2. A card that will cause another utility program to be executed (e.g., DUMP, SAVE, RESTO, FILGN).
3. A FORM card

Figure 21 is an example of a complete set of control cards for a job.

The first card after the MON\$\$ EXEC UTILITIES card indicates that file MR3 is to be formatted, addressed, and cleared. The next card indicates the HA2 is AMPLESIXSIXZERO and will appear at the beginning of each track in this file. The two REC cards establish areas for six records on each track of the file; the records are 380, 160, 380, 160, 160, and 380 characters long. The padding characters for these records are blank, R, blank, S, S, and blank, respectively. The addresses preceding the records are ttttAA, tttt00, ttttAB, tttt02, tttt03, ttttAC, respectively.

The second FORM card is a valid card for the control program. It indicates there are no more REC cards for this format program.

Error Conditions

When an error occurs in a 1301 or 2302 Disk Format/Address Generator program, the special-end-of-

Line	Label	Operation	OPERAND													
3	5	6	15	16	20	21	25	30	35	40	45	50	55	60	65	70
0.1			REC				RA2ABLCI,1X500,F,RA250Q33,10X100,RA23J454,3X80									
0.2																

Figure 20. Example of REC Control Card for Standard Record Addresses

Line	Label	Operation	OPERAND													
3	5	15	16	20	21	25	30	35	40	45	50	55	60	65	70	
0.1	MON\$\$	EXEC				UTILITIES										
0.2		FORM				1301,MR3,FMT,HA										
0.3		HA2				AMPLESIXSIXZERO										
0.4		REC				RA2AA,1X380,RA200,1X160,R,RA2AB,1X380										
0.5		REC				RA202,2X160,S,RA2AC,1X380										
0.6		FORM				1301,MR2,RA										
0.7																

Figure 21. Example of a Set of Control Cards for Execution of the IBM 1301 Disk Format/Address Generator Program

program condition is set. When the program is operating in a mode other than TEST, the following occurs: routines under control of the Utilities control routine are executed, but no succeeding programs are run until next JOB card is recognized. For example, assume that the following cards are in the *STU* (line numbers appear at left for reference).

01	MON\$\$	EXEQ	UTILITIES
02		FORM	----
03		HA2	----
04		REC	----
05		DUMP	----
06		FORM	----
07		HA2	----
08		REC	----
09	MON\$\$	EXEQ	JOB A1
10	MON\$\$	EXEQ	UTILITIES
11		DUMP	----
12	MON\$\$	JOB	----

If an error occurs in the first format program, that program will not be completed. The print and format programs following (lines five and six) will be completed, but no programs from the next EXEQ card (line 9) to the next JOB card (line 12) will be executed.

IBM 1301 and 2302 Disk Format/Address Generator Messages

Two messages will be typed on the console when the 2302 Disk/Format Address Generator is used.

Before the format operation is started, the message SET FORMAT KEY FOR 2302 MODULE, TYPE \$50 will be typed.

When the format operation has been completed, the message SET FORMAT KEY TO OFF, TYPE \$50 will be typed.

When the message has been typed on the console, the program goes into the wait loop routine; when the operator has set the key off, he enters \$50 and the program will continue.

All invalid control cards are printed on the *SPR*. In addition, the following messages may appear on the *SPR* (in each case the 10401 message appears on the console):

SYMBOLIC UNIT NOT 1301

The symbolic unit specified on the FORM card is not a 1301 Disk Storage Unit.

SYMBOLIC UNIT NOT 1302

The symbolic unit specified on the FORM card is not a 2302 Disk Storage Unit.

SYMBOLIC UNIT ASSIGNMENT ERROR

This message is caused by:

1. Specifying a symbolic unit that is not assigned or is not an MRX-, MTY-, or MWZ-type unit. No formatting is attempted.
2. Defining the "nnnn" or "mmmm" on the FORM card so that formatting is requested beyond the limits of the symbolic unit. An attempt is made to format the available portion of the file.

DISK WRITE ERROR

Attempts to write on a track were unsuccessful.

END OF 1301 FORMAT

The program was successfully completed.

END OF 1302 FORMAT

The program was successfully completed.

NO HA2 CARD

No HA2 card was found immediately following the FORM card.

NO REC CARD

No REC card was found immediately following the HA2 card.

READ ERROR ON HA2

An error was detected while reading the HA2 card.

NO HA2 AND READ ERROR

The card immediately following the FORM card was not an HA2 and contained an error.

READ ERROR ON REC

An error was detected while reading a REC card.

NO REC AND READ ERROR

The card immediately following the FORM card was not a REC card and contained an error.

INVALID CARD

A card was read that was not a valid termination to the format series.

INVALID CARD AND READ ERROR

A card that was not a valid termination to the format series was read. This card contained an error.

INVALID HA2

The indicated HA2 is less than two characters.

INVALID RECORD DEFINITION

This message is caused by one of the following conditions:

1. The RA2 field was not found on the REC control card.
2. The indicated RA2 is less than two characters long.
3. The nnXgggg field was not found on the REC control card.
4. The nn part of the nnXgggg field is zero.
5. The gggg part of the nnXgggg field indicates a record of less than two characters.
6. The nn part of the nnXgggg field is over three characters long, or the gggg part is over four characters long.

TRACK LENGTH ERROR

The records defined exceed the track length.

WRONG LENGTH RA

The nonstandard record address generated by the user's routine is longer than the area available on the track.

NOTE: The 1311 Disk Format/Address Generator program is described in the publication *Support of IBM 1311 Disk Storage Drives Under the Operating System*.

File Save Program

The File Save program transfers data from specified areas of IBM 1301 or 2302 Disk Storage onto magnetic tape or punched cards. Both the magnetic tape and the punched card output are in a form that can be used as input to the companion File Restore program. The File Save program can record the contents of either (1) a symbolic unit or part of a symbolic unit or (2) one or more entire 1301 or 2302 disk surfaces, or a part of one or more surfaces.

The symbolic unit type of operation transfers data from the unit specified on the SAVE control card to magnetic tape or punched cards. The user can specify the limits of the symbolic unit area to be transferred, as with the Disk Print utility program (see "Disk Print Program").

The 1301/2302 disk-surface type of operation transfers the contents of all of a disk surface onto magnetic tape or punched cards. The starting point is specified on the SAVE control card according to channel access arm, module, and address of the outermost track.

The size of the output tape record is equal to the size of the disk record plus 11. Magnetic tape output of the File Save program is on MW2. If the data to be saved resides on 1301 Disk Storage, the output tape can be a maximum of 2,847 characters in length. If the data to be saved resides on 2302 Disk Storage, the output tape can be a maximum of 5,916 characters in length.

If punched card output is specified, the File Save program places its output on the SPV. The format of the cards is that of the standard Load card, with one exception: the relocation indicators are omitted. (See "Load Card" in the publication *System Monitor*.)

Each user should maintain a current set of format decks for his disk file, as well as a description of record addresses, HA2's, and record formats.

Because of the possibility of changed data, the File Save program must not be used while a Tele-processing complex is open or while a Type III SPOOL operation is being performed. The program cannot be used with shared disk files at any time when the other member of the sharing complex is operating on the data.

SAVE Control Card

The SAVE control card specifies one area of disk storage to be recorded on tape. With the symbolic unit type of operation, data transfer can start at the beginning of a symbolic unit or a specified number of tracks

from that point. With the disk-surface type of operation, the start address must be the outermost track of the disk surface; however, data transfer may begin a specified number of tracks from that point. If the disk-surface type of operation is used, and more than one disk surface is to be saved, an additional control card must be included (see "Optional Control Cards — Disk Surface Save," below).

The first operand of the SAVE card must be the type of disk unit (e.g., 1301); other operands may appear in any order. Omitted parameters need not be represented by commas.

The format of the SAVE card is shown in Figure 22.

The entries have the following meanings:

130x	This entry identifies the type of disk storage. "x" can be either 1 or 2.
symunit	This entry can be a symbolic unit (Mxy), or the camtttt start address (channel, access arm, module, and track) for a disk-surface save. If a symbolic unit (Mxy) is specified, x must be R, T, or W (i.e., the symbolic unit must be designated as a reserve, Tele-processing, or work file). If camtttt is specified, tttt must be the address of the outermost track of the disk surface.
mode	(Optional) This entry is LOAD or MOVE. If this parameter is omitted, Load mode is assumed. If a symbolic unit is specified, all tracks of the symbolic unit must be recorded in the same mode.
PUNCH	(Optional) This entry indicates that the specified area of the file is to be punched on the SPV in Load-card format. The option is used for manual correction of file errors; no tape output is written if the punch option is selected. If this parameter is omitted, the output is written on MW2 and no punched card output is produced.
+xxxx	(Optional) If this parameter is used, the first character must be a plus sign. The parameter specifies that the File Save program is to begin the transfer of data to be saved xxxx tracks from the starting point of Mxy. If this parameter is omitted, data transfer starts at the beginning of Mxy.
Syyyy	(Optional) If this parameter is used, it contains the number of tracks to be saved. The four-digit number must be preceded by S. If the parameter is omitted, the program continues the transfer of data to the end of the specified unit.
Gzz	(Optional) The G in this operand indicates that the file to be saved is an rocs Form C file (sequential-geometric) and may be partitioned; zz indicates the number of records per track. If the number of records per track is less than ten, the number must be preceded by a zero. The Read Single Record instruction is used by the Utility program. If this parameter is omitted, the program uses the Read Full Track with Home Address instruction. This parameter has no significance for a disk-surface type of save.

SYMBOLIC UNIT NOT 1302

A symbolic unit specified on the SAVE card is not a 2302 Disk Storage unit. The error causes termination of the program; control is given to the Utility control routine.

SYMBOLIC UNIT MW2 NOT TAPE

MW2 is assigned to a physical unit that is not a tape unit. The error causes termination of the program; control is given to the Utility control routine.

UNCORRECTABLE ERROR ON MW2

An uncorrectable input/output error occurred on symbolic unit MW2. The error causes termination of the program; control is given to the Utility control routine.

Messages on the SPR Only

The following messages may appear in the listing on the SPR:

END OF REEL ON MW2

The magnetic tape output unit assigned to symbolic unit MW2 has reached end-of-reel before all the records have been written. The program switches to the next reel. If no alternate unit is provided, a 20101 cu console message is issued and a waiting loop is entered; this permits the operator to mount a new reel. Processing continues to the end of the disk file.

END SAVE PROGRAM

The program has been completed. The output tape file is rewound and unloaded.

File Restore Program

The File Restore program reads data produced by the File Save program and restores this data to the same area of IBM 1301 or 2302 disk storage from which it was taken. The data can be restored to either (1) a symbolic unit or part of a symbolic unit or (2) an entire disk surface or part of a disk surface. Input to the File Restore program can be either on magnetic tape or punched cards.

If the input is on magnetic tape, the tape must reside on symbolic unit MW2. An option of the File Restore program allows the user to specify that input is Load card input produced by the File Save program. (The cards are in standard Load card format except that the relocation indicators are omitted.) As in the case of the File Save program, this option is used for manual correction of file errors. It also provides an efficient method of restoring corrected data to the disk storage file.

Because of the possibility of changed data, the File Restore program must not be used while a Tele-processing complex is open or while a Type III SPOOL operation is being performed. The program cannot

be used with shared disk files whenever the other member of the sharing complex is operating on the data.

Restore Control Card

The Restore control card (RESTO) specifies one area of disk storage to which data is to be restored. The format of the RESTO control card is shown in Figure 26.

The first operand of the Restore card must be the type of disk unit; other operands may appear in any order. Omitted parameters need not be represented by commas.

The entries have the following meanings:

130x	This entry specifies the type of disk storage. "x" can be either 1 or 2.
symunit	This entry can be a symbolic unit (Mxy) or the camtttt start address (channel, access arm, module, and track) for disk-surface restore. If a symbolic unit is specified, x must be R, T, or W (i.e., the symbolic unit to which the data is restored must be a reserve, Tele-processing, or Work file). If camtttt is specified, tttt must be the address of the outermost track of that surface.
mode	(Optional) This entry is LOAD or MOVE. If the entry is omitted, Load mode is assumed.
PUNCH	(Optional) This option allows the user to read cards punched in Load card format from the syu. The data contained on the cards is restored to the specified area of disk storage. If this parameter is omitted, the input is assumed to be on symbolic tape unit MW2.
+xxxx	(Optional) If this parameter is used, the File Restore program skips xxxx records from the beginning of the tape assigned to MW2 and starts restoring data at that point on the tape. xxxx must be preceded by a plus sign. If this parameter is omitted, and the PUNCH parameter is not specified, data transfer starts at the beginning of MW2. This parameter has no significance when used in conjunction with punched cards (i.e., when the PUNCH parameter is specified).
Syyyy	(Optional) If this parameter is used, it specifies the number of tape records to be restored in the operation. The four-digit number must be preceded by an S. If the parameter is omitted, the File Restore program restores all the records saved.
WDC	This parameter specifies that a Write Disk Check be performed after each disk write operation.
Gzz	(Optional) The G in this parameter indicates that the file to be restored is an iocs Form C file (sequential-geometric) and may be partitioned; zz indicates the number of records per track. If the number of records per track is less than ten, the number must be preceded by a zero. If this parameter was specified on the SAVE control card for the File Save program, the Gzz parameter in the File Restore program must be the same. The Read Single Record instruction is used by Utility program. If this parameter is omitted, the program uses the Write Full Track with Home Address instruction. This parameter has no significance for a disk-surface type of restore.

Line	Label	Operation	OPERAND													
3	5	6	15	16	20	21	25	30	35	40	45	50	55	60	65	70
0.1			RESTO 130x, symunit, mode, PUNCH, txxxx, Syyyy, Gzz													
0.2																

Figure 26. Format of the RESTO Control Card

Figure 27 is an example of a RESTO control card. The type of disk storage to which the file is restored is 1301 (first operand). The symbolic unit to which the data is restored is MR2. Since no mode is specified, Load mode is assumed. Because PUNCH is not specified, the data is restored from MW2 rather than from the SIU. 174 records (tracks on disk) are skipped from the tape assigned to MW2 and the restoring begins with the 175th record on tape into the 175th track from the beginning of symbolic unit MR2; 326 tracks of data (fourth operand) are restored. In the data transfer, the program uses the Read Single Record instruction (the last operand in the example specifies that the file to be restored is an IOCS Form C file and 35 records per track must be written). If this RESTO card were used to restore data saved through use of the SAVE card shown in Figure 23, the last parameter would have to be G06.

Line	Label	Operation	OPERAND												
5	6	15	16	20	21	25	30	35	40	45	50	55	60	65	70
0.1				RESTO	1301	MR2	+174	S	326	G	35				
0.2															

Figure 27. Example of the RESTO Control Card

File Restore Messages

The following messages may appear in the listing on the SPR. In each case except the END RESTORE PROGRAM message, the program issues a 10401 console message and sets a special end-of-program condition in Resident Monitor.

SYMBOLIC UNIT NOT AVAILABLE

A symbolic unit specified on the RESTO card is not assigned to any physical unit. The error causes termination of the program; control is given to the Utility control routine.

SYMBOLIC UNIT NOT 1301

A symbolic unit specified on the RESTO card is not a 1301 Disk Storage unit. The error causes termination of the program; control is given to the Utility control routine.

SYMBOLIC UNIT NOT 1302

A symbolic unit specified on the RESTO card is not a 2302 Disk Storage unit. The error causes termination of the program; control is given to the Utility control routine.

SYMBOLIC UNIT MW2 NOT TAPE

MW2 is assigned to a physical unit that is not a tape unit. The error causes termination of the program; control is given to the Utility control routine.

FILE ON MW2 DIFFERS FROM CONTROL CARD

The file on symbolic unit MW2 does not correspond to the file specified in the RESTO control card. The error causes termination of the program; control is given to the Utility control routine.

*** CARD SEQ ERR *** (contents of card)

One of the punched cards containing data to be restored is not in the correct sequence. (The user had specified the PUNCH option in the File Save program, and the order of the deck has been changed.)

UNCORRECTABLE ERROR ON MW2

An uncorrectable input/output error occurred on symbolic tape unit MW2. The error causes termination of the program; control is given to the Utility control routine.

END RESTORE PROGRAM

The program has been completed.

NOTE: When a disk error that cannot be corrected occurs, no message is issued; the erroneous track record is printed on the SPR and the program is terminated.

Data File Generator Program

The Data File Generator is a Utility program used primarily to produce data files for testing purposes. The program allows the user to create files in various formats; the files produced by the Data File Generator may serve as input to the program(s) being tested.

The Data File Generator module exists as one phase in the complete utilities program package. For execution of the program, the following control cards are required (in addition to the MON\$\$ EXEQ UTILITIES card): the FILGN Data File Generator card (see Figure 28) and the FCN file-specification control card. File-specification control cards describe the type of file to

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41			

Figure 28. FILGN Control Card

be generated. The user can also include several optional file-specification control cards.

When the utility scan routine encounters a `FILGN` card, the utility control routine loads the Data File Generator program and transfers control to that program. Subsequent file-specification and data cards are read by the Data File Generator program.

Data cards must contain all the data to be included in the file. These cards are placed on the `SIU` or `AIU`. File-specification control cards, with the exception of the `FGN` card, may be interspersed among the data cards.

Input Specifications

Input to the Data File Generator program can be in punched card or card-image format; the data cards must reside on the `SIU` or `AIU` with the control cards. If the user is generating Form 1, 2, or 3 records (see *Basic Input/Output Control System*), data from a selected portion of the input card can be used; in the `FGN` file-specification control card, the user specifies the first and last input-card columns containing data. Each new record must begin in the first specified data column of a new card.

An input card set consists of the file-specification control cards and the input data cards; several input cards sets can be used during one execution of the Data File Generator program. One data file is produced for each input card set. When a new input card set is read the program destroys the control information for the previous set. The first card in each input card set must be the `FGN` card for that set.

If the user is generating Form 1 or Form 3 data records his input cards must contain a record mark and group mark in the last two data columns for each record. This requirement enables the user to build files of variable-length records. The record mark and group mark may appear anywhere within a data area as long as the two characters will be adjacent to each other in core storage; for example, if columns 24-60 are specified as the data area, a record mark could appear in column 60 of one input card and the group mark in column 24 of the next card. However, if the record mark and group mark appear in any data columns other than the last two on the card, all succeeding data columns on that card are ignored. The next record begins on the first data column of the next card. Thus, in the above example, columns 25 through 60 of the card containing the group mark in column 24 are ignored.

If the user wishes to generate a file containing Form 4 records, he must specify on the `FGN` control card the low-order position of the Record Character-Count field. The Record character-count field that this entry points

to must contain numeric data. If the data records span more than one card, the low-order position of the Record Character-Count must be located on the first input data card (i.e., the location specified by the user must be within the first eighty columns of the data record). The user also specifies on the `FGN` card the number of characters in the Record Character-Count field. Form 4 records are generated in Load mode and the user must specify Load mode on the `FGN` card.

Other Group-Mark and Record-Mark Considerations

The record mark and group mark pair required for generation of Form 1 or Form 3 data records is not counted in the user's `FGN`-card block size specification. In the generation of all record forms group marks are acceptable as data; however, a data group mark cannot appear in column 1 of an input data card.

If Form 2 records are generated, the user's block size and record length entries on the `FGN` card must reflect the presence of the record mark; in this case, the record mark is added by the Data File Generator program. Form 2 records are the only records for which the program generates a record mark (if record marks are desired for other record forms, the user must include the record mark in the input data).

Example: A user wishes to generate Form 2 records, 225 characters each (including the record mark), two records per block, and to use columns 10-72 of the input data cards to contain the data. The following list shows the input data card sequence for one block, the number of characters on each card, and the columns containing the characters:

CARD SEQUENCE	NUMBER OF CHARACTERS	CARD COLUMNS CONTAINING THE CHARACTERS
1	63	10-72
2	63	10-72
3	63	10-72
4	35	10-34
5	63	10-72
6	63	10-72
7	63	10-72
8	35	10-34
.	.	.
.	.	.
.	.	.

The user specifies the record length of 225 characters in columns 6-9 of the `FGN` card, and a block size of 0450 in columns 10-13 of the `FGN` card. The Data File Generator program places a record mark in the 225th position of each record.

Output Specifications

The user indicates the nature of the output file via the `FGN` and optional file-specification control cards.

Output from the program can be written on magnetic tape or IBM 1301 or 2302 Disk Storage. MW4 is the output symbolic unit unless the user specifies a different unit. The user can generate Form 1, 2, 3, or 4 records (the description and specifications for each of these record forms are contained in *Basic Input/Output Control System*). Maximum output tape record size is 9000 characters. Maximum output disk record size is as follows:

	1301	1302
Move mode	2800	5850
Load mode	2165	4533

Output can be written in Move or Load mode. Form 4 records, however, must be written in Load mode. If Form 2 records in Load mode are written, the program can be used to add word marks to the records (see "WMK" control card). The user can specify the parity (even or odd) in which the output file will be written. Multireel files or multifile reels can be generated; output of both types can be produced during one execution of the Data File Generator program. If disk files are being generated, the Write Disk Check option is available.

For generation of Form 3 and Form 4 records, the user has the option of including a word mark in the high-order position of the Block Character-Count field; an A and a B bit are always generated in the low-order position of this field. The Block Character-Count is calculated by the program and inserted in Form 3 and Form 4 records; the user's specification on the FGN card of the block size or maximum block size must reflect the presence of the Block Character-Count.

Tape-Label Options

If the user wishes the Data File Generator program to process tape labels, he must communicate all tape-label information via the LBL file-description control cards. Omission of this card indicates that tape labels are not to be processed.

If labeled files are to be produced by the Data File Generator program, the second parameter of the System Generation `IOKDF` macro-statement must be "D." If "D" is not specified, the appropriate exits will not be available to the program.

Tape labels alone cannot be written by the Data File Generator. At least one data record must be included.

Formats for header and trailer labels are entirely independent of each other. The user may elect to write both header and trailer labels, only header labels, or only trailer labels. He may specify the processing of IBM 1410 80-character labels, IBM Standard 120-character labels, or nonstandard labels. Having ini-

tiated the writing of one particular type of label, the user may at any subsequent time change the label format or cancel the writing of tape labels. If IBM 1410 80-character labels or IBM Standard 120-character labels are processed, the user has the option of having the IOCS check, on output, the retention period of the old header label.

Other IOCS Options

Several additional IOCS options can be specified for inclusion during the execution of the Data File Generator program. The user can bypass uncorrectable erroneous records, or process them as if they were error-free (see "ERROPTNS" in *Basic Input/Output Control System*). He can take advantage of the IOCS rewind options (see "RWDOPNS," also described in *Basic Input/Output Control System*). Both the ERROPTNS and RWDOPNS features are indicated via the FGN file-specification control card.

Two IOCS macro-instructions can be executed by control-card specification. These macro-instructions are: (1) `IOCTL RELSE, OUTPUT, FILE`, and (2) `IOCTL FEOR, OUTPUT, FILE`. The control cards for each are the RLS card and EOR card, respectively. The point at which the card is included in the input data deck determines the point during processing at which the macro-instruction is executed.

Data File Production

A single input card set, which produces one data file, consists normally of the following cards:

```
FILGN
FGN — control card
LBLH (optional)

DATA — cards
LBLT (optional) (LBLT — card can also precede data cards)
END
```

If a multifile `DATA-FILE` is wanted, the card set normally consists of several input card sets (i.e., for form 1 records).

```
FILGN
FGN control card for file 1
LBLH card for file 1 (optional)
DATA cards for file 1
LBLT card for file 1 (optional)
EOF for file 1

FGN control card for file 2
LBLH card for file 2 (optional)
DATA cards for file 2
LBLT card for file 2 (optional)
EOF for file 2

FGN control card for file n
LBLH card for file n (optional)
DATA cards for file n
LBLT card for file n (optional)
END
```

The rewind options on respective FGN control cards must be chosen so that the different files do not overlay each other when generated on the same tape by causing the IOCS to rewind the tape every time a file is opened/closed.

The EOF card, which after closing the files terminating the current input card set, directly calls in the Data File Generator program by branching to the load routine, can be replaced by an END card.

In this case, the following input card set must be preceded by a FILGN card because the END card passes the control to the utility control program after closing files and terminating execution. The above remark about rewind-option is also valid in this case.

Every END and/or EOF card also generates a tape mark on the output file.

Data File Generator (FILGN) Control Card

The Data File Generator (FILGN) control card specifies to the Utilities control routine that the Data File Generator program is to be executed. The card consists of only one entry: FILGN in columns 16-20 (see Figure 28).

File-Specification Control Cards

The file-specification control cards used with the Data File Generator program include one required and six optional cards. To achieve their desired effect, the control cards must be placed at specific positions within the input card set. Leading zeros in numeric data must be included on all cards.

FGN Control Card

The FGN card is required and must be the first card in an input card set. (Each input card set produces one data file; several data files can be produced during an execution of the Data File Generator program by including additional sets of cards.) An input card set cannot include more than one FGN card.

The format of the FGN card, the possible entries for each field, and the explanation of the entries are as follows:

CARD COLUMN	POSSIBLE ENTRIES	MEANING OR FUNCTION
1-3	FGN	Card identification:
4	T	Generate a magnetic tape file.
	1	Generate a 1301 Disk Storage file. The Full Track Witout Record Addresses instruction is used.
	2	Generate a 1302 Disk Storage file. The Full Track Without Record Addresses instruction is used.
5	1,2,3, or 4	Record form indication. The entry signifies the desired form of the records

CARD COLUMN	POSSIBLE ENTRIES	MEANING OR FUNCTION
6-9	xxxx	on the generated file. The numbers correspond to IOCS record-form definitions (see <i>Basic Input/Output Control System</i>).
	yyyy	For Form 2 records: the length of the record. The record mark added to each record by the Data File Generator must be included in the count.
	bbbb	For Form 4 records: the low-order position of the Record Character-Count field. The entry cannot be greater than 0080.
10-13	xxxx	For Form 1 or Form 3 records: the field must be left blank.
	yyyy	For Form 2 records, or Form 1 or Form 3 fixed-length records: the size of the block. If Form 3 records are generated, this figure must reflect the Block Character-Count field. (For complete information on determining this figure, see "BLOCKSIZE" in <i>Basic Input/Output Control System</i> .)
	yyyy	For Form 4 records, or Form 1 or Form 3 variable-length records: the maximum block size. If Form 3 or 4 records are generated, this figure must reflect the Block Character-Count field. (See <i>Basic Input/Output Control System</i> .)
14	M	Write the output in Move mode.
	L	Write the output in Load mode.
15	1 or b	This entry corresponds to the IOCS ERROPTNS options. A 1 indicates that during the execution of the Data File Generator program, all uncorrectable, erroneous records are to be skipped. A blank indicates that all uncorrectable, erroneous records are to be processed as though they were error-free.
16	1 or b	Parity indicator. A 1 signifies that the program should write the magnetic tape output in odd parity. A blank indicates that either the program should write the magnetic tape output in even parity, or that the output is not on magnetic tape.
17	1 or b	Write Disk Check indicator. A 1 signifies that a Write Disk Check should be performed after each write disk operation. A blank indicates that this operation should not be performed.
18	n or b	For Form 4 records: the number of characters in the Record Character-Count field (n=1, 2, 3, or 4). If records in any other form are being generated, this field should be blank.
19	1 or b	If Form 3 or Form 4 records are being generated, and the user desires a word mark in the high-order position of the Block Character-Count field, this entry should be a 1. If the option is not desired, or no Block Character-Count field will be present (Form 1 or Form 2 records), this entry should be a blank.

CARD COLUMN	POSSIBLE ENTRIES	MEANING OR FUNCTION
20-23	xxxx	This entry indicates the iocs rewind options desired; each character may be either R, U, N, or B. (See the "RWDOPNTS" in <i>Basic Input/Output Control System</i> .)
24-25	xx	For Form 1, 2, and 3 records: this entry indicates the card column in which the data for the file begins.
	bb	For Form 4 records: this field must be blank.
26-27	xx	For Form 1, 2, and 3 records: this entry indicates for each card the last card column in which data for the file appears.
	bb	For Form 4 records: this field must be blank.
28-30	xxx	This entry indicates the symbolic unit for output. This symbolic unit may be a work, reserve, or Tele-processing file.
	bbb	If the field is left blank, MW4 is assumed.
31-80	(Optional)	Comments or information may be included in this field.

An example of the FGN control card is shown in Figure 29. Information provided by this card is as follows:

INFORMATION	CARD COLUMNS PROVIDING INFORMATION
FGN card.	1-3
Data file will be on tape.	4
Form 2 records will be generated.	5
Records will be 80 characters long.	6-9
Each block will be 800 characters.	10-13
File will be written in Load mode.	14
"Accept" iocs option will be used.	(no entry in 15)
Magnetic tape will be written in even parity.	(no entry in 16)
Write Disk Check feature will not be used.	(no entry in 17)
There will be no Record-Character Count.	(Column 18 must be blank)
There will be no Block-Character Count.	(Column 19 must be blank)
RRUU rewind options will be used.	20-23
Data begins in column 01.	24-25
Data ends in column 80.	26-27
Output will be on MW4.	(no entry in 28-30)
No comments are included.	(31-80 is blank)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	
F	G	N	T	2	0	0	8	0	0	8	0	0	L						R	R	U	U	0	1	8	0																

Figure 29. Sample FGN Control Card

WMK Control Card

The WMK control card is optional; if used, it must be placed immediately after the FGN card. Only one WMK control card may be included with each input card set.

The WMK card can only be used when Form 2 records in Load mode are generated. The program will add word marks at the specified positions.

Up to 19 word marks for each record can be specified. Columns 1 through 3 on the control card must contain the letters WMK. Columns 4 through 79 are divided into 19 fields of 4 positions each. Starting in the first field (columns 4 through 7), the user indicates the position, within the record, at which the word mark should be placed. If more word marks are desired, their positions are indicated in the succeeding WMK card fields (columns 8-11, 12-15, 16-19, . . . , 76-79). The first blank field on the card (bbbb) indicates to the program that all word mark positions have been specified. All succeeding columns must be blank. Column 80 must always be blank. The columns specified on the WMK card can be in any order.

An example of the WMK control card is shown in Figure 30; the card specifies word marks in columns 17, 26, and 43.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42		
W	M	K	0	0	1	7	0	0	2	6	0	0	4	3																													

Figure 30. Sample WMK Control Card

LBL Control Card

The LBL control card is optional; if used, it must contain all information necessary for processing of tape labels. Until the Data File Generator encounters an LBL card, the program assumes that labels are not to be written. The LBL card also permits the user to specify a retention-period check. LBL cards may appear anywhere after the FGN card and within the input card set to which they pertain.

The format of the first eight columns of the LBL card, the possible entries for each field, and the explanation of the entries are as follows:

CARD COLUMN	POSSIBLE ENTRIES	MEANING OR FUNCTION
1-3	LBL	Card identification.
4	H	Information on this card is for header labels.
	T	Information on this card is for trailer labels.
5	S	IBM 1410 80-character labels or IBM Standard 120-character labels will be written.
	N	Nonstandard labels will be written.
6-8	080 or 120	Length of the label.

7

An asterisk in the high-order position of the retention period, file identification, file serial number, or reel sequence number field in the LBL card signifies that no alteration to the corresponding File Table field should be made. Therefore, the name by which the file is known should not include an asterisk in the high-

The x in column 32 of Figures 31 and 32 refers to the retention-period check option. If the user wishes to check the retention period of the old header label, he must place a 1 in this field. If no check is desired, column 32 must be blank.

The miscellaneous fields indicated in Figures 31, 32, 33, and 34 may contain any information the user wishes to include. The length of the fields are in accordance with IOCS format specifications (see *Basic Input/Output Control System*). In the figures illustrating LBL control card format for nonstandard labels (Figures 35 through 42), the letter in column 9 indicates whether the card contains the first or second half of the label. If the card contains the first half of the label, an A must be placed in column 9; if the card contains the second half of the label, a B must be placed in column 9.

Figure 31. LBL Card Format for IBM Standard 120-Character Header Labels

Figure 32. LBL Card Format for IBM 1410 80-Character Header Labels

Figure 33. LBL Card Format for IBM Standard 120-Character Trailer Labels

Figure 34. LBL Card Format for IBM 1410 80-Character Trailer Labels

Figure 35. LBL Card Format for the First Half of a 120-Character Nonstandard Header Label

Figure 36. LBL Card Format for the First Half of an 80-Character Nonstandard Header Label

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
E Ø F																																									

Figure 47. EOF Card

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42		
END																																											

Figure 48. END Card

Data File Generator Messages

All valid control cards are printed on the SPR. In addition, the following messages may be issued on the SPR:

END OF JOB

Execution of the Data File Generator program has been completed.

END OF FILE ON DISK

The 1301 disk area(s) comprising the specified symbolic output unit has been filled with records. The program searches for an EOF, END, or FGN card; Data File Generator cards not of this type are bypassed. If an FGN card is encountered, the program processes the new input card set.

ERROR — CARD OUT OF SEQUENCE

A card that must be in a specific position in the input card set (e.g., the FGN card) is not in that position. Remaining cards in the input card set

are bypassed, and the “ALL CARDS NEGLECTED . . .” message issued.

ERROR — RECORD EXCEEDS BLOCKSIZE — ERRPROC CONTROL CARD OPTION FOLLOWED

One of the records read by the Data File Generator program exceeds the blocksize specified in the FGN control card. The program accepts or skips the record in accordance with the error option indicated in column 15 of the FGN card.

INVALID END OF JOB

The program has completed execution but the desired results may not have been obtained.

ERROR — (erroneous entry)

One of the entries in a file-specification control card is in error. The error may have occurred, for example, in one of the following fields in the FGN control card: record form, file medium, mode, rewind option, parity option, Write Disk Check option, record size, or blocksize. Remaining cards in the input card set are bypassed, and the “ALL CARDS NEGLECTED. . .” message issued.

ALL CARDS NEGLECTED UNTIL NEXT EOF OR END CARD

During the execution of the Data File Generator program, an error occurred that necessitated the bypassing of the remaining cards in input set. A new input card set, if present, is processed. If no additional input card set is present, the program gives control to the Utility control routine.

Where more than one page reference is given, the major reference appears first. If an index entry refers exclusively or primarily to one utility program, the name of the program is given in parentheses.

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